

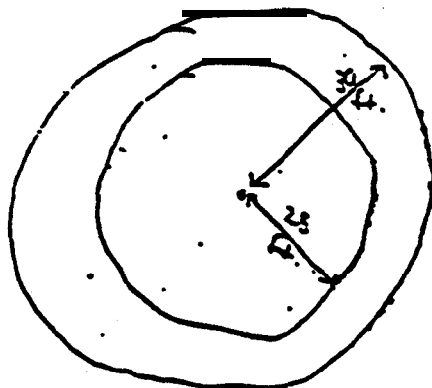
**1998**

**HIGH SCHOOL  
MATHEMATICS  
ANCHOR PAPERS  
SESSION 1**

The **outer ring of horses on** the merry-go-round is 30 feet from the center. The **inner ring is 25 feet from the center.** If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer,

$$2(3.14)30 =$$

$$2(3.14)25 =$$



$$C = 2\pi r$$

$$\text{outer ring} = 188.4 \text{ ft}$$

$$\text{inner ring} = 157 \text{ ft}$$

$$O = 15(188.4) = 2826 \text{ ft}$$

$$I = 15(157) = 2355 \text{ ft}$$

Difference is 471 ft.

Correct answer

**Correct and complete process**

- correctly calculates circumference of inner **and** outer rings
- multiplies both circumferences by 15 rotations
- subtracts to find difference in **distance** traveled

Exemplary Response 1

1



The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the *outer ring* and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

$$\begin{array}{r}
 3.14 \\
 \times 60 \\
 \hline
 000 \\
 1884 \\
 \hline
 188.40 \\
 \times 15 \\
 \hline
 94200 \\
 18840 \\
 \hline
 2826.00
 \end{array}$$

$$\begin{array}{r}
 3.14 \\
 \times 50 \\
 \hline
 000 \\
 1570 \\
 \hline
 157.00 \\
 \times 15 \\
 \hline
 00000 \\
 15700 \\
 \hline
 1570.00
 \end{array}$$

$$\begin{array}{r}
 2826.00 \\
 - 1570.00 \\
 \hline
 1256.00
 \end{array}$$

Subtracts to find difference in distance traveled

1256.00 ft

Incorrect answer

Error in computation  
 $-157 \times 15 = 2355$  not 1570

Student correctly finds circumference of inner and outer rings (188.4 and 157)

Correct Process;  
 Error in Computation

The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the **outer** ring and your friend is on **the** inner ring, what is the difference in distance **traveled** by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived **at** your answer.

$$C = 2\pi r$$

$$C = 2\pi(30)$$

$$C = 188.4 \times 15 = 2826 \text{ ft.}$$

$$C = 2\pi(25)$$

$$157 \times 15 = 2355 \text{ ft}$$

$$\begin{array}{r} 2826 \\ - 2335 \\ \hline \end{array}$$

491 ft

Recopying error  
--subtracts 2335  
(instead of  
2355) from 2826

Correct process  
-student finds correct distance  
of inner and outer rings 1

491 ft. is the difference in distance.

Incorrect answer 1

Correct Process;  
Recopying Error

1



The outer ring of horses on the merry-go-round is 30 feet from the center. The inner-ring is 25 feet from the center. If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

$$\begin{array}{r} 30 \times 15 = 450 \\ 25 \times 15 = 375 \\ 450 - 375 = 75 \end{array}$$

The difference is 75 ft

Incorrect answer

Incorrect process  
—student does not use  
equation for circumference

**SCORE 2**

2

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDETIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on **the** average ride time for the first 4 rides, what is the **maximum** number of rides you can go on during the hours you are at the park? Provide the work that shows **how you** arrived at your answer.

$$18 + 24 + 14 + 20 = \frac{76}{4} = 19 \text{ min per ride}$$

10 a.m. to 4 p.m. is 6 hours minus 30 min is 5 hrs + 30 min = 330 min

330 min divided by 19 min is 17.368

Correct answer

Correct and complete process  
—student shows all components  
given in the scoring guide

answer = 17 rides

**Go On**

Exemplary Response

Session 1

**SCORE 1**

21

**You** are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times **include** walking to the ride, waiting in line, and riding the ride.

**RIDE TIMES**

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the maximum number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

$$\text{Average Time} = \frac{18 + 24 + 14 + 20}{4} = 19 \text{ min.}$$

(10 AM through 4 P.M.) = 30 min:

$$6 - 30 = 5 \text{ hrs. or } 30 \text{ min} =$$

$$5 \cdot 60 + 30 =$$

$$300 + 30 = 330 \text{ min}$$

**Correct process**

—student finds correct average and divides 330 by 19

$$\frac{330 \text{ min}}{19 \text{ min}} = 15 \text{ rides}$$

**Incorrect answer**

— $330 \div 19 \approx 17$  not 15

**Go On**

2 You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride #	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the **maximum** number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

10 to 4

6 hours

$$6 \text{ hours} = 360 \text{ min}$$

$$19 \overline{)360} = 18.95$$

18 rides

Correct process

—student finds correct average (19 min.) and divides

Incorrect answer

—½ hour lunch time not accounted for in figuring total time  
—360 ÷ 19 (instead of 330 ÷ 19)

$$\begin{array}{r} 18 \\ 24 \\ 14 \\ 20 \\ \hline 76 \text{ min} \end{array}$$

$$476 = 19 \text{ min per ride}$$



2

SCORE 0

You are going to be at the amusement park **from** 10 A.M. to 4 P.M. and **will** spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in **line**, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the *maximum* number of rides you can go on during the hours you are at the park? Provide **the** work that shows how **you** arrived at your answer.

$$\begin{array}{r}
 30 \\
 24 \\
 14 \\
 18 \\
 20 \\
 \hline
 106 \text{ min} \\
 \times 5 \\
 \hline
 530 \\
 5.3 \text{ hrs}
 \end{array}$$

$$\begin{array}{r}
 76 \\
 \times 4 \\
 \hline
 304 \\
 60 \overline{) 304} \\
 5.06 \text{ hrs}
 \end{array}$$

6 hrs

18 rides

Incorrect answer

Incorrect process

--student does not figure 330 minutes total ride time

--attempts guess and check using 76 minutes and/or 106 minutes

Go

3

On Fun Fridays, prizes and discounts are given away to the first 300 people who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every 14th person receives a 10% discount on any food they buy that day. Of the first 300 people who enter the park on Fun Friday, how many will receive both a free ride coupon and a 10% discount on food? Provide the work that shows how YOU arrived at your answer.

Correct process

--indicates 42 as the least  
common multiple  
-divides 300 by 42

6 12 18 24 30 36  
14 28

42
42

$$\frac{300}{42} = 7 \text{ sets of matches}$$

Correct answer

(Exemplary Response)

3

On Fun Fridays, prizes and discounts are given away to the first 300 people who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every 14th person receives a 10% discount on any food they buy that day. Of the first 300 people who enter the park on Fun Friday, how many will receive both a free ride coupon and a 10% discount on food? Provide the work that shows how you arrived at your answer.

$$14 \overline{) 21428571} \quad 300$$

21 10% discounts

*Incorrect process  
—divides 14 into 300*

7 will receive both a coupon + a 10% discount

*Correct answer*

3

On Fun Fridays, prizes and discounts are **given** away to the first 300 **people** who enter the amusement park. Every 6th person who **enters** the park gets a coupon for a free ride on the Twister, and every 14th person **receives** a 10% discount on any food **they** buy that day. Of the first 300 **people** who enter the park on Fun Friday, how many will **receive** both a free ride coupon **and** a 10% discount on food? Provide the work that shows how you arrived at your answer.

SCORE 0

50 people receiving coupons  
$$\begin{array}{r} 50 \\ 6 \overline{)300} \end{array}$$

21 receiving 10% discount.  
$$\begin{array}{r} 21 \\ 14 \overline{)300} \end{array}$$

71 people receive both.  
$$\begin{array}{r} 50 \\ +21 \\ \hline 71 \end{array}$$

**Incorrect process**  
– divides 14 and 6 into 300  
and adds the quotients

**Incorrect answer**

**SCORE 3**

4

A parking lot near the amusement park charges \$2.00 for the first hour and \$0.50 for each **additional half** hour. Write an equation that you could use to **calculate** the parking fee (**F**) based on the **number** of hours (**h**) you spend at the amusement park.

$$F = \$2 + \$1(h-1)$$

**Correct equation for finding parking fee (F)**

Using your equation, how much **will** you pay **the** parking attendant for  $6\frac{1}{2}$  hours of parking time? Provide the work **that** shows how you arrived at your **answer**.

$$F = 2 + 1(6.5-1)$$

$$= 2 + 5.5$$

$$F = 7.5$$

**Correct solution for F where h is 6.5**

**\$7.50**

**Correct process for calculating F using student's equation**

**Go**

**Exemplary Response  
(Three Components)**

**Session 1**

4

A parking lot near the amusement park charges \$2.00 for the first hour and \$0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee ( $F$ ) based on the number of hours ( $h$ ) you spend at the amusement park.

$$F = \$2.00 + \$1.50(h-1)$$

*Incorrect equation*

*-student does not multiply \$0.50 by 2 to get the hourly rate*

Using your equation, how much will you pay the parking attendant for  $6\frac{1}{2}$  hours of parking time? Provide the work that shows how you arrived at your answer.

$$F = \$2.00 + \$1.50(6.5-1)$$

*Appropriate solution for F where h is 6.5*

\$ 4.75

*Correct process for calculating F based on student's equation  
-student's equation is correctly applied*

*Appropriate Solution Using Incorrect Equation*

**SCORE 2**

4

A parking lot near the amusement park charges \$2.00 for the first hour and \$0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee ( $F$ ) based on the number of hours ( $h$ ) you spend at the amusement park.

$$F = \$2.00 + \$1.50(h-1)$$

*Incorrect equation*

*—student does not multiply \$0.50 by 2 to get the hourly rate*

Using your equation, how much will you pay the parking attendant for  $6\frac{1}{2}$  hours of parking time? Provide the work that shows how you arrived at your answer.

$$F = \$2.00 + \$1.50(6.5-1)$$

*Appropriate solution for F where h is 4.5*

\$ 4.75

*Correct process for calculating F based on student's equation*  
*—student's equation is correctly applied*

*Appropriate Solution Using Incorrect Equation*

**SCORE 1**



A parking lot near the amusement park charges \$2.00 for the first hour and \$0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee ( $F$ ) based on the number of hours ( $h$ ) you spend at the amusement park.

2.00 first hour  
\$.50 = additional hour

$$F + h = ?$$

**Incorrect equation for F**

Using your equation, how much will you pay the parking attendant for  $6\frac{1}{2}$  hours of parking time? Provide the work that shows how you arrived at your answer.

5-1 - 5 1/2 - 4.  
\$2.00    \$.50    \$.50    \$.50    \$.50    \$.50    \$.50    \$.50    \$.50    \$.50  
1 - 1/2 - 1/2 - 1/2 - 1/2 - 1/2 - 1/2 - 1/2 - 1/2 - 1/2  
\$7.50

**Process does not use equation**

**Correct solution for F**

**One Component**

111573



4

A parking lot near the amusement park charges \$2.00 for the first hour and \$0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee ( $F$ ) based on the number of hours ( $h$ ) you spend at the amusement park.

S C O R

No equation

Using your equation, how much will you pay the parking attendant for  $6\frac{1}{2}$  hours of parking time? Provide the work that shows how you arrived-at your answer.

1st hr = 2.00  
2nd hr = 1.00  
3rd hr = 1.00  
4th hr = 1.00  
5th hr = 1.00  
6th hr = 1.00

7.00\$ for  $6\frac{1}{2}$  hours of parking time

Incorrect solution for  $F$  where  $h$  is 6.5

Incomplete process for calculating  $F$   
—student finds fee for 6 hours, not  $6\frac{1}{2}$  hours

**5**

Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

RTSC  
RSTC  
RTCS  
RSCT  
RCTS  
RCST

6 different ways for each person  
 $\times 4$  different people

24 possible combinations

Correct and complete process  
-shows 6 possibilities beginning with Ryan  
-multiplies 6 possibilities by 4 people

Correct answer

Exemplary Response

5

Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

RTSC  
RTCS  
RSTC  
RSLT  
RLST  
RCTS

24 different combinations

Correct answer

Incomplete process  
--does not show 6 possibilities  
x 4 people

130322

Go On

**5**

Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. if only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

 $6 \times 4$ 

24

**Correct answer** **$6 \times 4$  is not a sufficient process**

5

Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

R =

T =

S =

C =

R, T, S, C,

T, S, C, R

S, C, T, R

C, T, R, S

R, S, C, T.

R, C, T, S

T, R, S, C

T, C, R, S

S, T, R, C

S, R, T, C

C, S, R, T

C, R, S, T

Incomplete list

12

Incorrect answer

# Directions

Use this table to do Numbers 3 and 4.

SCORE 2

RYAN'S  
PRACTICE \*RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	57

*Completes table correctly*

16

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

$$\begin{array}{r} 31 \\ +12 \\ \hline 43 \end{array} \quad \begin{array}{r} 43 \\ +14 \\ \hline 57 \end{array}$$

*Indicates correct pattern in  
table and in work space*

*Exemplary Response*

# Directions

Use this table to do Numbers 3 and 4.

SCORE

1

RYAN'S  
PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	57

Completes table correctly

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

Pattern is not clearly or correctly explained

Went into  
a pattern 2  
every

43, 57

**Directions**

Use this table to do Numbers 3 and 4.

RYAN'S  
PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	58

*Pattern is incorrect*

$5f = 21$

*Incorrectly completes table  
—43 is correct, but 58 is not*

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

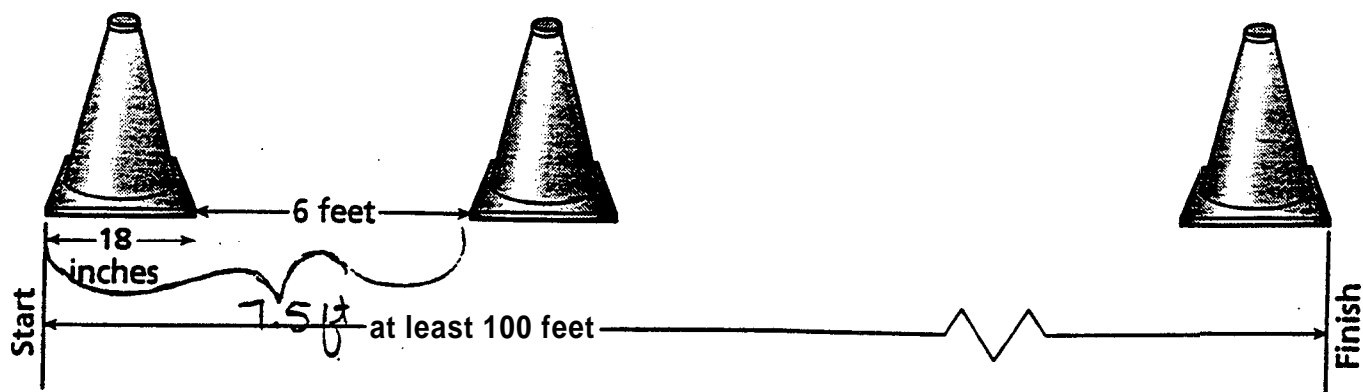
If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.'

43 | 58



7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the minimum number of cones required to make a course that is at *least* 100 feet long? Provide the work that shows how you arrived at your answer.

$$18 \text{ inches} = 1.5 \text{ feet}$$

$$6 + 1.5 = 7.5$$

$$\frac{100}{7.5} = 13\frac{1}{3}$$

$$14 \times 7.5 = 105 + 1.5 = 106.5$$

cones                      end cone

Exactly how many feet long will the course be?

$$14 \times 7.5 = 105 + 1.5 = 106.5$$

15 cones

Correct number of cones

Correct and complete process  
-divides 100 ft by 7.5 ft,  
rounds to 14 cones, and  
adds end cone

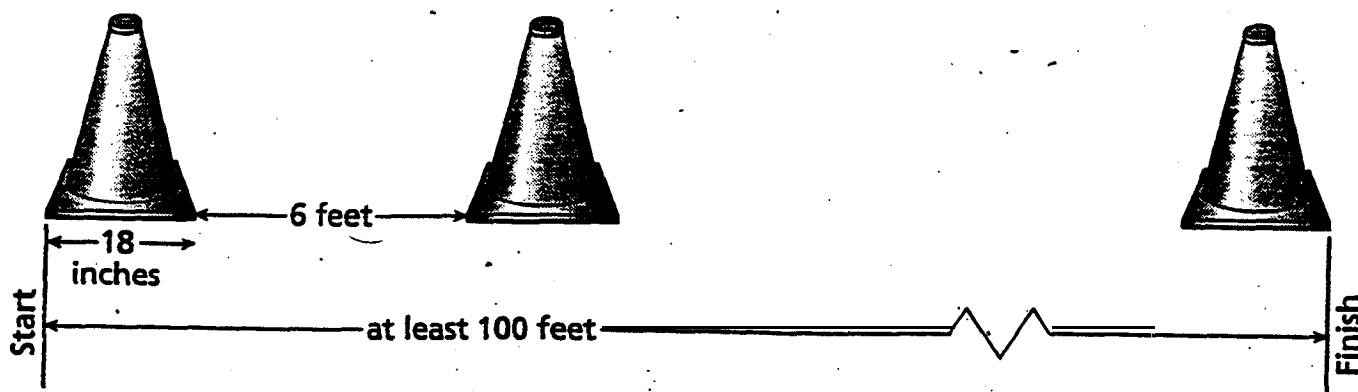
106.5 feet

Correct number of feet

Exemplary Response

7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the *minimum* number of cones required to make a course that is *at least* 100 feet long? Provide the work that shows how you arrived at your answer.

15 cones

Correct number of cones

No process shown

Exactly how many feet long will the course be?

106.5 feet

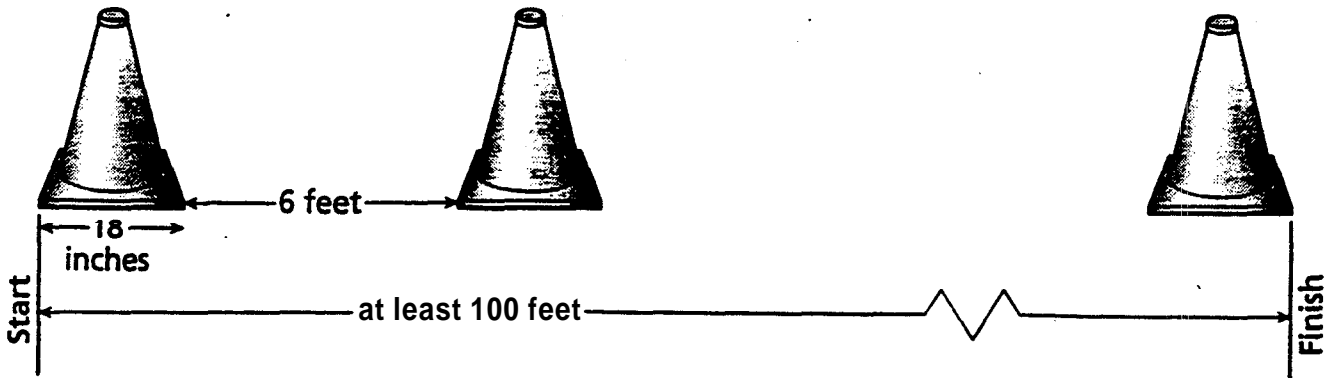
Correct number of feet

106.5 feet

Two Components

7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the *minimum* number of cones required to make a course that is at least 100 feet long? Provide the work that shows how you arrived at your answer.

$$18 - 12 = 6$$

$$1\frac{1}{2} \text{ ft}$$

$$6x + 1\frac{1}{2}x = 100$$

$$7\frac{1}{2}x = 100$$

$$13\frac{1}{3}$$

14 cones

Incorrect number of cones

Incomplete, but sufficient, process  
-equation implies the division process,  
"100 ÷ 7½"

Exactly how many feet long will the course be?

$$14(1\frac{1}{2}) + 6(14)$$

$$21 + 84$$

Incorrect number of feet

$$105 \text{ ft}$$

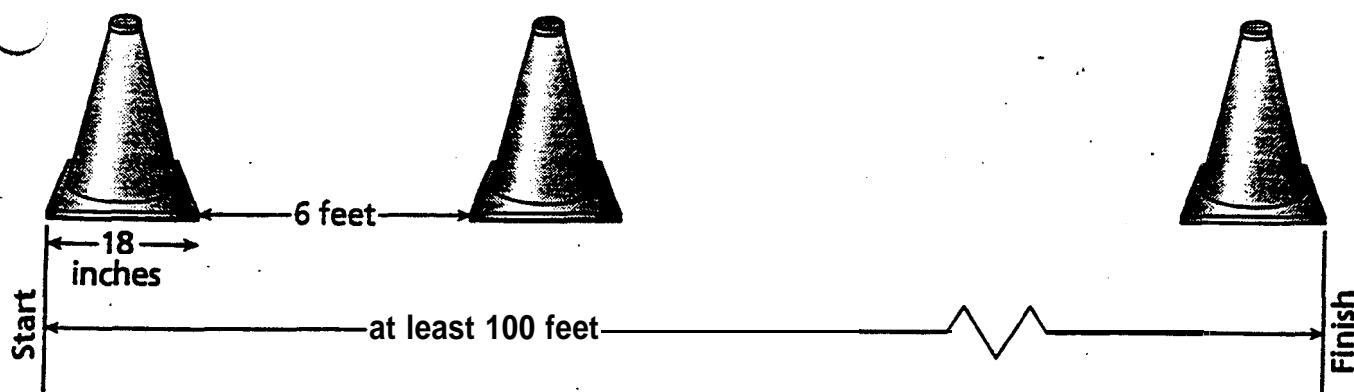
One Component

110219

Go On

7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the *minimum* number of cones required to make a course that is **at least** 100 feet long? Provide the work that shows how you arrived at your answer.

18"

$$\begin{array}{r} 16 \\ 6 \overline{) 100} \\ \underline{60} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

$$\begin{array}{r} 16 \\ 6 \overline{) 100} \\ \underline{96} \\ 4 \end{array}$$

Incorrect process  
—divides 100 feet  
by 6 rather than  
by 7.5 ft.

26 Cones

Incorrect number  
of cones

1.5 6 1.5 6 1.5 6 1.5 6 1.5

$$\begin{array}{r} 2 \\ 31.5 \\ \underline{5} \\ 87.5 \end{array}$$

8 5 6 1.5

Exactly how many feet long will the course be?

95 feet

Incorrect number of feet